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Analysis of buffered assembly line productivity

Abstract

Purpose – The paper aims to study car assembly line, to show its productivity rate, and to derive a mathematical model for the productivity rate of the assembly line segmented into sections with embedded buffers.

Design/methodology/approach – The paper performs productivity calculations based on data obtained from the assembly processes of a car and shows the maximum productivity of the assembly line. The equations of the assembly line productivity, the optimal number of assembly stations, and the necessary number of the assembly line's sections with buffers are derived via the criterion of maximum productivity.

Findings – The paper provides the productivity diagram of the assembly line that illustrates various measures of productivity, one that depends on the number of assembly stations, the number of sections in the line, and the capacity of the buffers. The diagram is based on the proposed mathematical equations for the productivity of the assembly line as a function of the assembly technology, number of stations, number of sections, and the capacity of the buffer.

Research limitations/implications – Solutions towards increasing the productivity of the assembly line are given based on the results of the study and analysis of the assembly processes in real industrial environments.

Practical implications – The paper includes the equation for the productivity of the assembly line, which is segmented into sections with limited capacity of the buffers, thereby enabling the calculation of its maximum productivity and the optimal number of assembly stations.

Originality/value – The paper presents an analysis of productivity and a mathematical model for calculating the productivity of the assembly line, which is segmented into sections with embedded buffers of limited capacity. The initial results of the research have been obtained from a real industrial environment.

Keywords; Manufacturing; Automotive; Assembly.